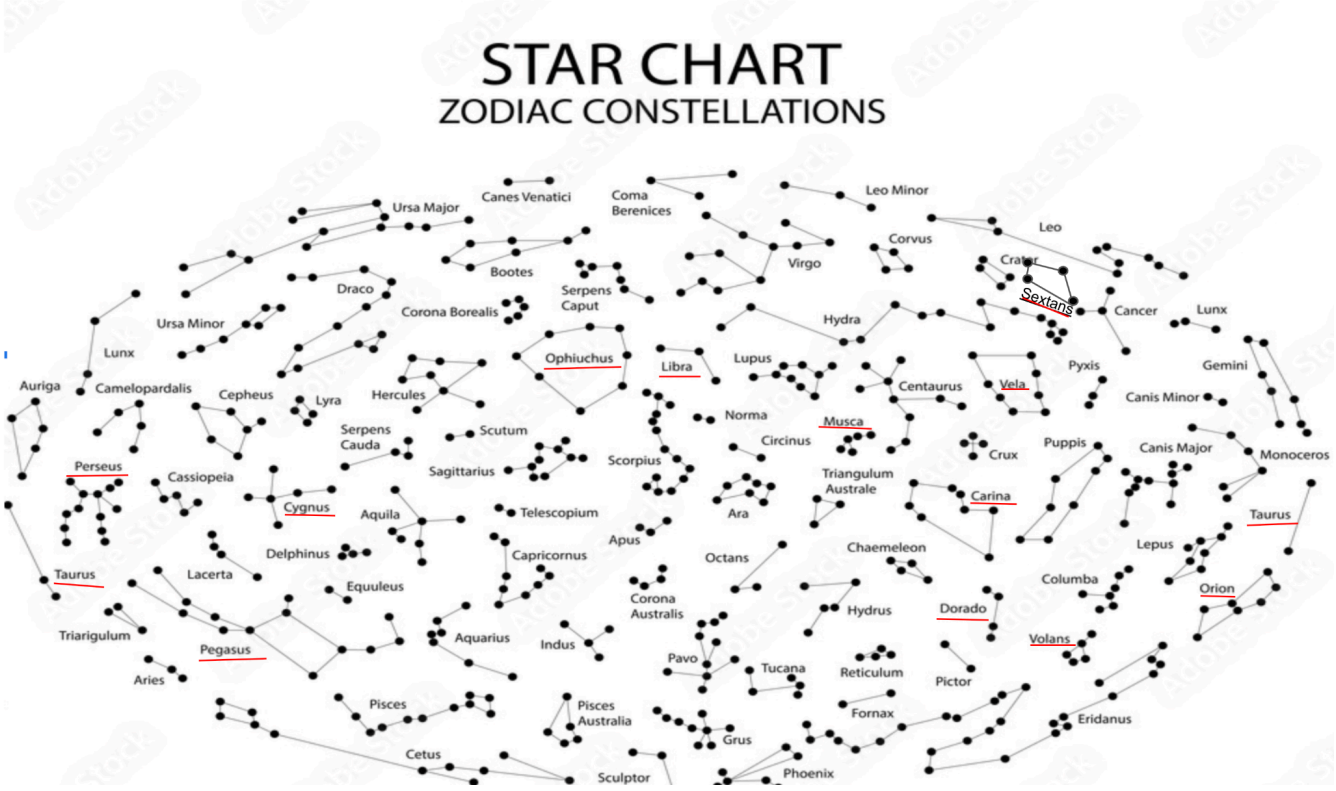


https://www.soinc.org/reach- There are 88 in total

Taurus (The Bull)-NGC 1555 sometimes known as Hind's Variable Nebula, Sh2-238 or HH 155, is a variable nebula 4 light years across,[2] illuminated by the star T Tauri, located in the constellation Taurus. It is 400 light years away from Earth in the Taurus Molecular Cloud, and has a magnitude (B) or in terms I can understand 9.98. It is also in the second Sharpless catalog as 238. It might be Herbig–Haro object which means it might have newborn stars inside it .[4] The nebula was discovered on October 11, 1852, by John Russell Hind. It has a right ascension of $4^h21^m57.1^s$ or 66.96° 1.1686725 radians form the vintage point of the sun and a declination of +19°32'7" declination is ascension from the Earth vintage point and because Earth moves it is a lot it is more involved and useless. In pictures it it is a little arch of dust with (from our point of view) with the massive T Tauri taking up most of the image

Ophiuchus (Serpent-grabber)-Barnard 68 Is a dark nebula at 407 light years away it's radius is 0.25 light years it is so dark you can't see it in the visible wavelength it is 16K or -431 °F it is in the Ophiuchus constellation it's right ascension of $17^h 22^m 38.2^s$ or 260.66° or 4.549375228 radians. In pictures it is a big splotch.

Taurus (The Bull)-T Tauri A whole type of stars was named after it a star being under 10 million years old it is 1 million years old and it is in the constellation Tartarus it was discovered in October, 1852, by John Russell presumably October 11 do to it's proximity to NGC 1555 which he also discovered but it seems no one else has made this connection it is a star system with T Tauri North AKA T Tau N, T Tauri south A AKA T Tau sa and T Tauri south B AKA T Tau sb but Tau north is 300 AUs away it is mainly seen in inferred as it blocked by a Accretion disk or more specifically a Circumstellar ring but you can see T Tau north the "south stars have a magnitude of less than 19.6 it has 3 protoplanetary disk one for each star just take each of the stars AKA names and add protoplanetary disk a protoplanetary disk is a disk circumstellar disk or Accretion disk it has a right addition of 04h 21m 59.43445s or 65.5° or 1.143191 radians.For pictures (see NGC 1555)

Carina (The Boat)-HD 95086 Or Aiolos It is a star about 282 light years away it has a low Fe/H index of −0.25±0.5 (~55%) which is a measure of metal for reference -2.47 is the average so this star has a lot of metal but not more than our sun witch has 0 by definition it is 13.3 million years old and is 1.6 solar masses making it a A type star it is in the same system as HD 95086 B an exoplanet that was named Levantes 5x larger than Jupiter it orbits at 70 AUs it was discovered by Rameau and using the aptly named very large telescope it is very red. It is in the constellation Carina Right ascension $10^h 57^m 03.02157^s$ 164.26° or 2.866877829 radians.

Carina (The Boat)-NGC 3324 Is an open cluster 9,100 ly away from the Earth it is 30 ly across it combined with the emission nebula IC 2599 AKA gum 31 they are called Gabriela Mistral Nebula it's in the constellation Carina. Right ascension of $10^h 37^m 20^s$ 159.33° or 2.780833097 radians

Cygnus (The Swan)-V1057 Cygni Is a binary star V1057 Cygni is a variable star which does particular change in magnitude and was the second star discovered to change this much it went form a type dKe (one of the lowest types of star) to F-type supergiant (one of the highest) in, get this, 1! year the test might call this a "nova like event") its companion component B or V1057 Cygni B was discovered in 2016 it is in the constellation cygnus right ascension $20^h 58^m 53.73367^s$ 314.73° or 5.493074755 radians.

Sextans (The Sextant)-Baby Boom Galaxy Creates 4,000 stars per year (400X the milky way) making it a starburst galaxy it is also the brightest starburst galaxy it is in the constellation Sextans it has a right ascension of $11^h 0^m 54.52^s$ 165.23° or 2.88380752 radians

Dorado (The Fish)-30 Doradus A.K.A the Tarantula Nebula it is in the constellation Dorado it was discovered in 1751 it has a black hole in it which is pretty cool in pictures it is a bunch of red dust with a hole in it surrounded by white dust it is the 8th largest galaxy ever discovered

Libra (Scales of Justice)-HD 141569 It is a trinary star system but 2 of the stars are red dwarfs. It also has 2 rings of dust and potentially a 3rd the outer one is split into two sections creatively named inner and outer so now HD 141569 A is a star with 2 rings surrounding having just one is super uncommon in stars they normally turn into planets after the protostar becomes a normal star; constellation Libra in pictures it is a what looks light a head light with 2 red things next to it in the void of space

Musca (The Fly)-HD 100546 Is a star that has 1 confirmed exoplanet with 2 maybe exoplanets the 1st maybe exoplanet could be not a planet but another star or 2 planets and the 2ed one is a maybe because we don't know anything about it but the one confirmed exoplanet is the largest ever discovered being ~6.9X Jupiter's mass but it could be only 4X or 9.6X we have no idea; constellation Musca in pictures it is a blue splotch

Pegasus-Stephan's Quintet It is a grouping of 5 galaxies (NGC 7317 7318a and b 7319 7320) making it the first compact galaxy group. 2 of the galaxies (7318a and b) are merging and it was one of the first objects pictured by the James Webb telescope Stephan made a mistake NGC 7320 is actually very far away from the others; constellation pegasus in pictures it looks like 5 galaxies with 2 merging and one very small and far away (NGC 7317)

Perseus-NGC 1333 Is a reflection nebula that is very well studied, one of the most well studied reflection nebulae; constellation perseus in images it looks like a dust cloud, pink to the north red to the south west blue in the middle.

Orion-HOPS 383 Youngest star to have an outburst(X-Ray) (an outburst is when a star goes way up in absolute magnitude) it was also the first discovered;Constellation Orion. In pictures it has a very big black torus (donut) of space dust surrounded by red and has a big yellow ball inside.

Orion-FU Orionis this star has a star type named after it a FU Orion star is a star that varies greatly in magnitude it was the 1st one discovered by ALMA. It also has another star presumably named FU Orionis b. Constellation Orion. In pictures it looks like a big orange circle with a darker orange dust cloud around it

Taurus (The Bull)-L1527 Is one of the nobody stars that got thrust into stardom by the James Webb space telescope; constellation taurus. In pictures it looks like 2 triangles stacked onto each other top one red bottom one blue.

Volans (The Flying Fish)-J122051+491225 is a green pea galaxy. They make a lot of stars, have lots of oxygen, and are really compact.These are filled with stars and produce lots of ultraviolet light. They ground research on early star forming galaxies. J122051+491225 is 4,000 light years across and is 170 million light years away. It was photographed by the James Webb telescope. It appears the be a bluish greenish dot with a scale below it. It is inside the constellation Volans.

RCW 38 is an HII region containing a massive star cluster. It contains many young stars and protostars. It is located in the constellation Vela. It looks like a rusty brown band in the middle, white and blue above it, and blue below it. It is surrounded and filled with stars.

Orion-Messier 42 AKA the Orion nebula, it is one of the most studied objects in the sky and revealed a lot about how nebulae and young stars work; constellation orion. In pictures it looks like a well, It's red to the east and south and white in the center and the rest is black and blue and red all swirling together.

Taurus (The Bull)-HL Tauri is a T Tauri star and one the most polarized T Tauri stars which means it only goes in a few directions. Constellation Taurus; in pictures it looks like a bunch of orange and red rings.

Vela (The Sail)-HH 46/47 is a complex of Herbig-Haro (HH) objects. They are found in nebulae. Jets of partially ionized gas come out of it, making visible shockwaves. It is found in the Vela constellation. It looks like a red band going from top right to bottom left with white at both tips. It has a faint aqua green surrounding it.

Vela (The Sail)-RWC 38 is a HII Region (Ionized gas). It had recently formed star clusters.It looks like two light blue hemispheres with a brown equator.

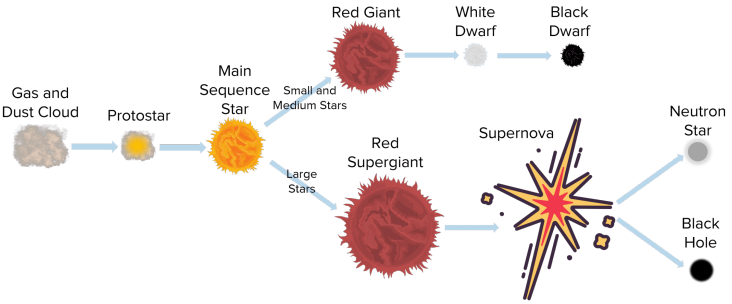
Types of Nebulae and Galaxies:

Nebulae-comes after a supernova and is usually a really vibrant cloud

Types of nebulae:
Bright nebulae
Dark nebula
Emission nebula
Planetary nebula
Reflection nebula
Variable nebula
Globular cluster-a cluster of tightly packed stars
open clusters-A few really bright starts

Radio Arrays:

- The Very Large Array (VLA) in New Mexico consists of 27 radio antennas arranged in a Y-shape up to 36km across, providing high resolution at centimeter wavelengths.[2]
- The Atacama Large Millimeter/submillimeter Array (ALMA) in Chile has 66 radio dishes acting as an interferometer at millimeter and submillimeter wavelengths.[5]
- The Very Long Baseline Array (VLBA) combines data from 10 radio telescopes across the United States to achieve the highest angular resolution.[2]

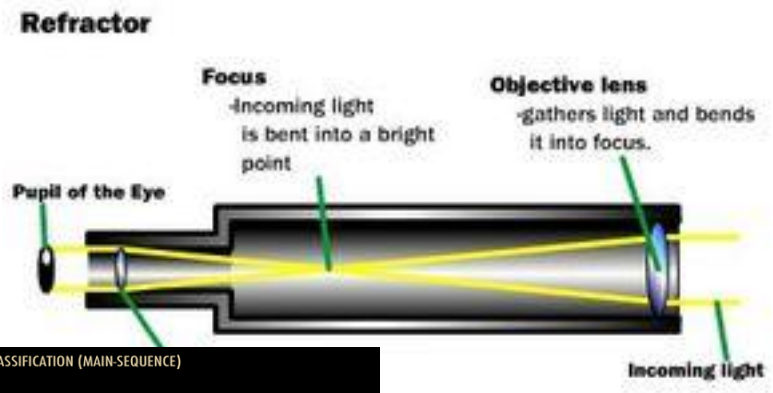


Life cycle of a star

ProtoStar formation:

Star formation happens when, in large, dark, and very cold clouds of gas and dust, a clump of gas reaches a critical mass. This is the point where the gas has enough gravity to pull more gas into it, making its gravity well deeper, sucking in more gas, causing a positive feedback loop throughout the gas cloud. A protostar is formed as gravity begins to pull the gasses together into a ball. This process is known as accretion. As gravity pulls the gasses closer to the center of the ball, gravitational energy begins to heat them, causing the gasses to emit radiation. At first, the radiation simply escapes into space. As accretion happens, protoplanetary rings begin to form around the protostar. In the protoplanetary rings, large clumps of stuff grow and suck up materials. These eventually become the planets. This positive feedback loop continues for a while, but eventually a protostar becomes a main sequence star when its core temperature exceeds 10 million Kelvin and it begins fusion and it continues its life.

Telescope:



Gravity Theory
Where G or the gravitational constant is $=6.674\times10^{-11}$
M_1 is the mass of the 1st object and m_2 is the mass of the second and R is the distance between the 2 objects and F is the gravitational force

kepler's 3 laws
1.)How planets orbit in ellipses (the image right below)
2.) A planets orbits at a constitute rate
3.)a planet's orbital period is proportional to the size of its orbit (the proportion is its period^3=radius (or semi major axis) squared)

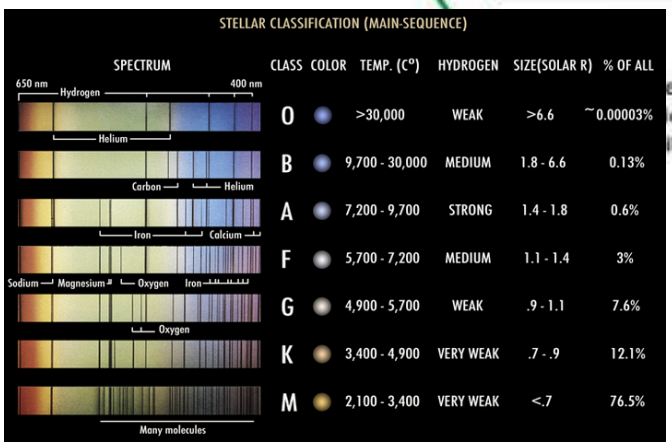
a is the radius of a elipsus and g see gravity theory

Stellar classifications
H-R classification

spectral
Color according to chromaticity
O-blue
B-deep bluish white
A--Bluish white
F-white
G-yellowish white
k-Pale yellowish white
M-Light Orangish red

Yerkes:

Mount willson:
sd:subdwarf
D:dwarf
Sg:subgiant
G:giant
C:supergiant



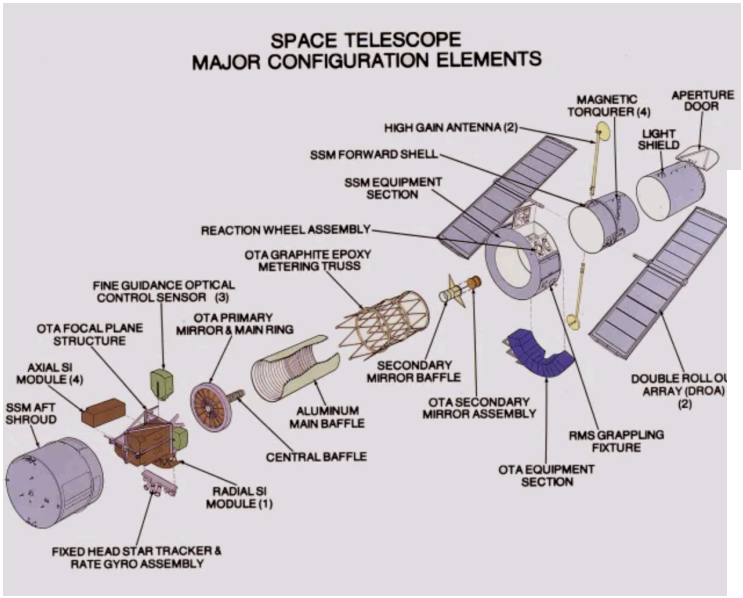
The Hertzsprung–Russell diagram

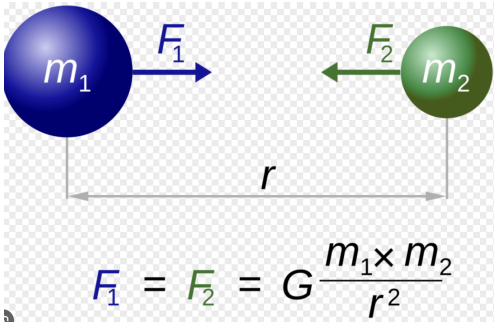
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Other
Ly means light years
Bigger stars burn hotter and thus brighter
au , astronomical unit 9,296,000 mi or 149604618237.159 meters
Luminosity is measured in joules per second with 1 luminosity equaling 3846000000000000000000000000 joules a second
Absolute magnitude is a measure of how bright something would be in the sky from earth if it was 10 parsecs away, the lower the magnitude the brighter the object is. it unsurprisingly uses magnitudes with going up or down 5 being equal to 2 magnitudes (a magnitude is how many digits are in a number E.G 54 has magnitude of 2 while 594.6 has a magnitude of 3)

Yerkes luminosity classes

Luminosity class	Description	Examples
0 *or* Ia+	hypergiants or extremely luminous supergiants	Cygnus OB2#12 – B3-4Ia+[22]
Ia	luminous supergiants	Eta Canis Majoris – B5Ia[23]
Iab	intermediate-size luminous supergiants	Gamma Cygni – F8Iab[24]
Ib	less luminous supergiants	Zeta Persei – B1Ib[25]
II	bright giants	Beta Leporis – G0II[26]
III	normal giants	Arcturus – K0III[27]
IV	subgiants	Gamma Cassiopeiae – B0.5IVpe[28]
V	main-sequence stars (dwarfs)	Achernar – B6Vep[25]
sd (*prefix*) *or* VI	subdwarfs	HD 149382 – sdB5 *or* B5VI[29]
D (*prefix*) *or* VII	white dwarfs[d]	van Maanen 2 – DZ8[30]





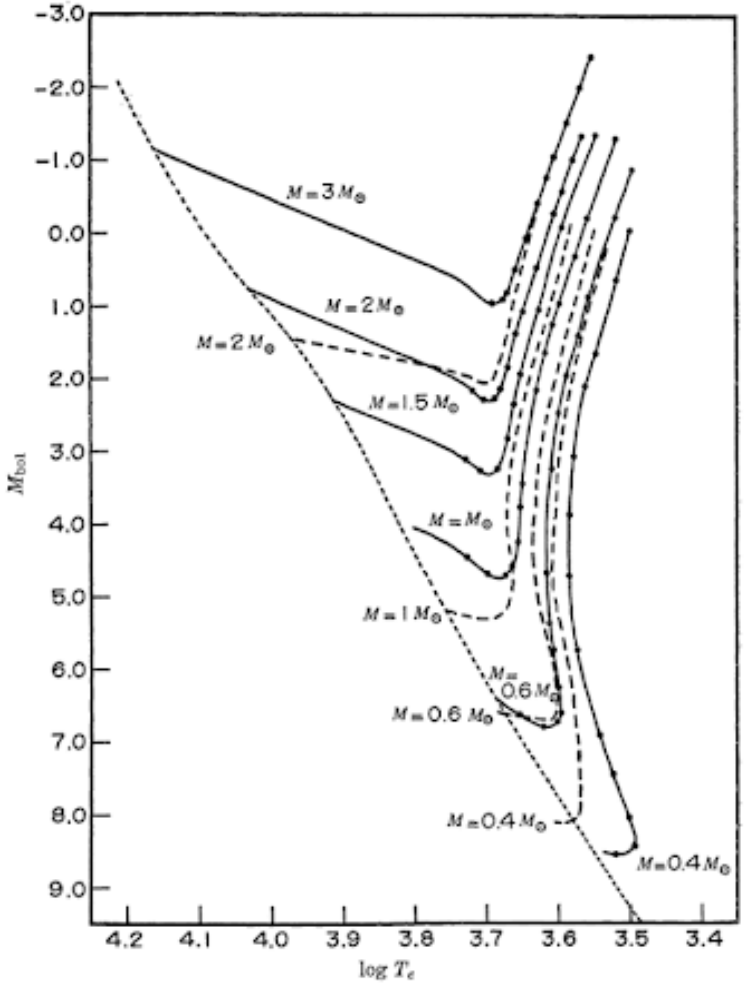


FIG. 1. Evolutionary tracks of gravitationally contracting stars. Solid curves represent the evolutionary tracks calculated with assumption of $l = H$ in this paper. Dashed curves represent those of C. HAYASHI et al. (7), (8). A dotted curve represents the empirical zero-age main-sequence given by SANDAGE (21), (22).

